FAA ACO ACE 118C

PRESENTATION
BREAKOUT SESSION
ON
MAJOR REPAIRS & ALTERATIONS

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THE FAA DER & MAJOR REPAIR OR ALTERATIONS

MAJOR REPAIRS AND ALTERATIONS FOR 145 STATIONS

- The DER'S Role in Major Repairs
- The DER'S Role in Major Alterations
- The DER'S Role in Minor Repairs & Alterations
- OEM Manuals & Service Bulletins
- The DER'S and Test Plans, Witnessing Test

Reference FAA Order 8110.37C

FAA DER MAJOR REPAIRS & ALTERATIONS

The FAA-DER and their roles in:

- **DER's and FAA 145 Repair Stations**
- **DER's and SFAR 36 Data**
- **DER's and Air Carriers Data**
- **DER's and OEM's Data**

Reference FAA Order 8110.37C

REPAIR STATIONS FAR 145

- An Engine DER can approve non-book repairs developed by CRS or by the DER, using FAR 21, 33, 43, requirements.
- Lets look at FAR 1.1 definition of a Major Repair….

Major repair means a repair: (1) That, if ***improperly done***, might ***appreciably affect, weight, balance, structural strength, performance, power-plant operation, flight characteristics***, or ***other qualities affecting airworthiness***; or (2) That *is* ***not done*** *according to* ***accepted practices*** *or* ***cannot*** *be done by* ***elementary*** *operations.*

REPAIR STATIONS FAR 145

Lets see what FAR 43 Appendix A says about Major Repairs

(b) **Major repairs** - (1) Airframe major repairs. Repairs to the following parts of an **airframe** and repairs of the following types, involving the *strengthening*, *reinforcing*, *splicing*, and *manufacturing of primary structural* members or *their replacement*, when **replacement is by fabrication such as riveting or welding, are airframe major repairs.**

(iii) **Special repairs to *structural engine parts* by welding, plating, metalizing, or other methods.**

(xiii) **Repairs to deep dents, cuts, scars, nicks**, etc., and **straightening** of aluminum blades.

REPAIR STATIONS FAR 145

Lets Look at Major Alteration Definition of FAR 1.1

Major alteration means an alteration ***not listed in the aircraft, aircraft engine, or propeller specifications***— (1) That might appreciably affect weight, balance, structural strength, performance, power-plant operation, flight characteristics, or other qualities ***affecting airworthiness***; or (2) ***That is not done according to accepted practices or cannot be done by elementary operations.***

• **Key words**: "*Specifications*" i.e.. EM, SB's, SIL's & SPM "*Affecting ,*"*Airworthiness, Accepted Practices, Elementary*"

FAR 43 IS A PERFORMANCE REGULATION

FAR 43 is for those authorized to perform Maintenance, Rebuild, and Alterations [Ref: 43.1]

Therefore it is not a "Design" requirement regulation

DER'S should not use this FAR as a "Design Compliance" statement, but can refer to it as guidance in support of compliance. Example;

FAR 43.13 (a) : **Each person performing maintenance, alteration, or preventive maintenance on an aircraft, engine, propeller, or appliance shall use the methods, techniques, and practices prescribed in the current manufacturer's maintenance manual or Instructions for Continued Airworthiness prepared by its manufacturer, or other methods, techniques, and practices acceptable to the Administrator, except as noted in §43.16. He shall use the tools, equipment, and test apparatus necessary to assure completion of the work in accordance with accepted industry practices. If special equipment or test apparatus is recommended by the manufacturer involved, he must use that equipment or apparatus or its equivalent acceptable to the Administrator.**

WHAT"S THE POINT?

FAR 43 Continued:

FAR 43.13 is an Instruction to those "PERFORMING" work

on a Engine, Aircraft, Propeller, or Appliance, that they MUST, do so by FAA Approved OEM instructions, or other FAA approved data!

The DER'S authority comes through the FAA ACO [Engineering], NOT FAA FSDO, who is responsible for Maintenance, and Installation Issues!

Therefore FAR 43 Appendix A is for CRS'S, and other FAA Certificated operators whom "DO NOT HAVE" Other FAA Acceptable data, and are bound by the limitations set forth in the FAR 43 Appendix A! and there operations authority. [Ref: FAR 43.13 (a) or other methods, techniques, and practices acceptable to the Administrator]

REPAIR & ALTERATION CLASSIFICATIONS

SHAKSPEARE: Is it Major or Is It Minor? That is THE Question!

PARAMOUNT! When in Doubt ASK your ACO advisor!

Don’t Misclassify ! ~ Here are some guidance documents to consider:

1. FAA FAR 1.1

2. FAA FAR 21.93, 21.95, 21.97

3. FAA FAR 43.13 & FAR 43 Appendix A

4. FAA AC 33.2B [Engine DER’S]

5. FAA Order 8110.4a, 8110.37C, & 8110.42A

DOCUMENTATION OF CLASSIFICATION

If you classified it as a MAJOR Design ~ Repair ~ Alteration

A 8110.3 is your only option!

If you classified the Design Repair or Alteration as a MINOR, you had better have "Documentation" written, and the method of your written classification and approval, rationale reviewed and accepted by your FAA ACO [Ref: FAR 21 Sub Part D 21.93, FAA Order 8110.37C, paragraph 611:

b. Minor repairs and alterations do not require FAA engineering approval; however, a technical rationale needs to be provided for the determination (justification) as to why the proposed repair/alteration is minor. In certain cases, some substantiation is required to show that the proposed repair/alteration has no effect on the weight, balance, performance, power plant operation, etc. The repair station is responsible for identifying the type or scope of repairs/alterations that are considered as minor and obtain the concurrence from the FSDO. Therefore, DER assistance in this manner is not required since minor repairs/alterations do not require FAA engineering approval.

CLASSIFICATION CONTINUED

The Keyword here is "REQUIRED" this does not mean it is not NECESSARY!

You should prepare a report in a format acceptable to your ACO advisor that defines your rationale, and reference your guidance documents!

This information on your "Minor" review classifications, should be submitted for review by the FAA at least once every six (6) month [Ref: 21.93 & 21.95], since this is what is allowed for TC, STC, and PMA product "Minor" design changes, and therefore unless directed differently by your ACO, would seem an appropriate time span for "Minor" Repairs and Alterations, but you should consult YOUR ACO advisor for guidance on the interval of submission!

AGAIN WHEN IN DOUBT ASK YOUR ACO ADVISOR!

Ref: 8110.37C

(4) Determination of Major/Minor Modifications. The decision as to whether a change to a type design is major or minor, as defined in 14 CFR part 21, section, 21.93, should be reviewed with the ACO if the decision is controversial or if the DER needs guidance. Major and minor design.

Federal Aviation Administration
Delegated Engineering Representative
Major/Minor Repair or Alteration Classification
[Per FAA Guidance & FAA Orders 8110.37C, and FAA Advisory AC 33.2B]
MINOR ALTERATION / REPAIR

Federal Aviation Regulation(s), FAA Orders, and FAA Advisories used for guidance to classification of Repairs, and/or Alterations: (Major/Minor): FAR 1.1 "Definitions: ***Major alteration*** means an alteration not listed in the aircraft, aircraft engine, or propeller specifications— (1) That might appreciably affect weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or (2) That is not done according to accepted practices or cannot be done by elementary operations.
Major repair means a repair: (1) That, if improperly done, might appreciably affect weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or (2) That is not done according to accepted practices or cannot be done by elementary operations.

FAR 21.93 Classification of changes in type design. (a) In addition to changes in type design specified in paragraph (b) of this section, changes in type design are classified as minor and major. ***A "minor change***" is one that has ***no appreciable effect*** on the ***weight***, ***balance***, ***structural strength***, ***reliability***, ***operational*** c***haracteristics***, or ***other characteristics*** *affecting the airworthiness of the product*. All other changes are "major changes" (except as provided in paragraph (b) of this section).

FAR 21.95 Approval of minor changes in type design. Minor changes in a type design may be approved under a method acceptable to the Administrator before submitting to the Administrator any substantiating or descriptive data.

FAR 21.97 Approval of major changes in type design. (a) In the case of a major change in type design, the applicant must submit substantiating data and necessary descriptive data for inclusion in the type design. (b) Approval of a major change in the type design of an aircraft engine is limited to the specific engine configuration upon which the change is made unless the applicant identifies in the necessary descriptive data for inclusion in the type design the other configurations of the same engine type for which approval is requested and shows that the change is compatible with the other configurations.

FAA AC 33.2B: 13. PROCESSING CHANGES IN TYPE DESIGN. (FAR Part 21, Subparts D and E).

a. ***Minor Changes.*** Section 21.95 applies to the approval of minor changes in type design. Such changes normally require only a drawing comparison to substantiate their airworthiness.

Typical examples of minor changes are included in the list, which follows this paragraph. ***These changes may be approved by the applicant's appropriately authorized DER***. An acceptable method of handling these changes includes submitting to FAA the engineering design change notices, where necessary, to fully describe the changes. Intervals between submittal of each new change, or group of changes, should not exceed six months. The following is a list of typical ***minor*** changes:

The following is a list of typical ***minor*** changes:

(1) Slight variations in clearances.
(2) Reasonable increase in radius of fillets.
(3) Increase in thickness, where the design permits it, without adverse effects.
(4) Change to equivalent, or improved material, in **minor parts: [non-critical, Non-Rotating, Non-Life Limited}**
(5) Improvements in heat treatments of parts, without reducing elongation of parts subjected to high stress.
(6) Small changes in the design of non-critical parts of the engine.
(7) Improvements in the manufacturing, or processing of parts, without reducing the material properties.

FAR 43 Appendix A: MAJOR ALTERATIONS, MAJOR REPAIRS, AND PREVENTIVE MAINTENANCE:

(a) ***Major alterations*** - (1) Airframe major alterations. Alterations of the following parts and alterations of the following types, ***when not listed in the aircraft specifications issued by the FAA***, are airframe major alterations: [See full listing in FAR 43.]

(2) ***Powerplant major alterations***. The following alterations of a powerplant ***when not listed in the engine specifications issued by the FAA***, are powerplant major alterations.

(b) ***Major repairs*** - (1) ***Airframe major repairs***. Repairs to the following parts of an airframe and repairs of the *following types*, involving the strengthening, reinforcing, splicing, and manufacturing of primary structural members or their replacement, when replacement is by fabrication such as riveting or welding, are airframe major repairs.

(3) ***Powerplant major repairs***. *Repairs of the following parts of an engine and repairs of the following types, **are powerplant major repairs**:* [see complete listing FAR 43]

(iii) Special repairs to structural engine parts by welding, plating, metalizing, or other methods.

(i) Any repairs to, or straightening of steel blades

FAA-DER NAME: _____ DER APPOINTING ACO: _____

DER'S DELEGATION AREAS [Ref FAA Order 8110.37C]:_____

APPLICANTS' NAME: _____

APPLICANTS' ADDRESS: _____

APPLICANT CONTACT & PHONE: _____

APPLICANTS: ACO/FSDO REGION: _____

PART CLASS TYPE [Airframe/Engine]: _____

PART MANUFACTURER: _____ MODEL: _____

PART NOMENCLATURE:_____

The Following Part Classification, and Repair or Alteration classification is based upon the preceding FAR's, FAA Orders, or Advisory Circulars. When no clear definition for proper classification is available the determination will be performed by the appropriate FAA ACO and/or FSDO. At that time it will be determined if a Major category exists, then a properly executed 8110.3 will be submitted by the FAA DER. Minor Changes [Repairs, Alterations] need not be submitted on an 8110.3 or require concurrence from the FAA ACO. [ref FAA Order 8110.37C, and AC 33.2B]

FAA SFAR 36 DATA

This is SPECIAL authority granted to FAR 145 & 121 operators, whom have an "Approved" manual and technical staff that the FAA administrator has granted SFAR 36 "Design" authority to!

This "Authority" is for these operators to review and approve their own Major Design and Alteration data for "Return to Service" of product they install!

This data is "Acceptable" NOT "Approved" data, and can only be used by the SFAR 36 facility doing the review, installation, and return to service!

Until the data is reviewed and "Approved by the FAA ACO" it is only "Acceptable data to FSDO" A DER may review the data and determine if the data is compliant to the applicable FAR's, and may "Approve the data" via a FAA Form 8110.3

AIR CARRIERS & DER'S

MANY U.S. AIR CARRIERS HAVE COMPANY DER'S

When engaged for DER services for an Air Carrier, here are some things to ask or know:

Transport Category Operators may have SFAR 36, DOA, or DAS authority, find out if they do, and determine if your review is appropriate. [Ask Your ACO Advisor for Guidance].

Make certain you know the destination of the end product [Exportation & Bilateral requirements may be at issue]

Talk with their FSDO PI, about your project!

Review the operators CRS Limitations, IPM, and Ops Spec's

OEM DATA & DER'S

A Properly authorized DER can review and "Approve" design changes to OEM data, within his/her delegated authority, provided:

- **The data is supportive of the design change**
- **The basis of the original certification is not altered**
- **That all "Test & Computations" have been done in accordance with acceptable industry or military standards**
- **No AD'S are on the subject product**

GOOD REPAIR DATA

SOURCES OF GOOD DATA:

- Public Domain “Military Derivatives” I.e. TF-39 = CF6-6
- JT3, JT4, JT8, were all derived from military counterparts
- CJ610 = J85, TF-34 = CF34 etc.
- Standard Practices Manuals, Other Similar documents
- MRB data from 3rd parties for similar parts
- Develop your own through Test & Computation method
- SFAR 36 “Accepted Data”[Data reviewed & Accepted by FAA]
- PMA or STC Data Sources, [STC data requires owners OK]
- Any other means acceptable to the FAA

What Can A DER Approve Regarding Repairs

- **Lets Look At Order 8110.37C DER Handbook**

CHAPTER 2 - AUTHORITY AND LIMITATIONS

What Can A DER Approve Regarding Repairs

Engine DER's may *prepare and/or approve*, within the limits of their appointment, the following items that comply with pertinent regulation(s):

(1) Engineering reports,

(2) Drawings, and

(3) Other data relating to **durability**, **materials**, and **processes employed** in **engine design**, ***operation***, and ***maintenance.***

What Can A DER Approve Regarding Repairs

FAA ORDER 8110.37C ~ Section 203

b. Major Repairs and Alterations. Specific authorization is required to examine and approve data for alterations and repairs. The DER should be assigned the authorized area of "Special-Major Repairs and/or Alterations," which will be related to the DER's basic delegations. The three specific authorizations are:

(1) Special -Major Repairs.

(2) Special- Alterations.

→ **(3)** Special-Major Repairs and Alterations.

What Can A DER Approve Regarding Repairs

Lets Look at Chart E (Engines DER) FAA Order 8110.37C

for other delegation areas:

Appendix 1

e. ENGINE.

(1) Approval of test plans.
(2) Operational procedures and limitations.
(3) Critical rotating parts lifing methodologies.
(4) Installation instructions.
(5) Airworthiness limitation sections.
(6) Repairs to critical engine parts.
(7) Software Verification and Validation.
(8) Engine Emissions.

What Can A DER Approve Regarding Repairs

APPENDIX 2. DELEGATED FUNCTIONS AND AUTHORIZED AREAS (Continued).

NOTES:

1. Established appointment areas for qualified applicants are indicated by "X".

2. Regulatory areas in which the designee is authorized are shown on FAA Form 8110-25.

Approve Changes to

	DELEGATED FUNCTIONS	AUTHORIZED AREAS A	B	C
1	DETAIL DESIGN	X	X	X
2	BLOCK TESTS	X	X	X
3	PERFORMANCE CHARACTERISTICS	X	X	X
4	VIBRATION ANALYSIS	X	X	X
5	OPERATION MANUALS	X	X	X
6	OVERHAUL MANUALS	X	X	X
7	SERVICE DOCUMENTS	X	X	X
8	EXHAUST EMISSIONS EVALUATION	X	X	X
9	SOFTWARE	X	X	X
10	SAFETY ANALYSIS	X	X	X
11	LIGHTNING/HIRF PROTECTION	X	X	X

What Can A DER Approve Regarding Repairs

- **Can a Properly Delegated DER develop and Approve**
  - **Major Repairs**
  - **Major Alterations**
  - **OEM Manuals**
  - **Service Documents**

Ref: FAA Order 8110.37C

THE ANSWER IS "YES" !!!

THINGS YOU SHOULD DO WHEN YOU EXECUTE A 8110.3

- **SEND ORIGINAL TO APPLICANT**
- **SEND A COPY OF A "FULL APPROVAL" 8110.3 TO YOUR ACO ADVISOR & ONE TO FSDO OF APPLICANT.**
- **RETAIN DESIGN DATA FOR TWO (2) YEARS**
- **MAKE DATA AVAILABLE TO YOUR ADVISOR [THEIR OPTION]**